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10/792,322	03/03/2004	Jea-Hyuck Lee	5000-1-542	4368
33942	7590	12/11/2006	EXAMINER	
CHA & REITER, LLC 210 ROUTE 4 EAST STE 103 PARAMUS, NJ 07652			LIU, LI	
			ART UNIT	PAPER NUMBER
			2613	

DATE MAILED: 12/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/792,322

Applicant(s)

LEE ET AL.

Examiner

Li Liu

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Drawings***

1. The drawings are objected to because the "F-P CD" should be changed to FP-LD" in Figure 9.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 4-6, 10-17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 2003/0142978) in view of Watanabe (US 6,847,758).

1). With regard to claim 1, Lee et al discloses a multi-wavelength optical transmitter (Figures 1 and 6) for multiplexing a plurality of channels having different wavelengths into an optical signal so as to output the multiplexed optical signal, the multi-wavelength optical transmitter comprising:

a plurality of lasers (Tx{B} 101-103 in Figure 1, or Tx{B} in Figure 6) for generating, by corresponding incoherent light (e.g., 112 broadband light source in Figure 1) received in the lasers, a plurality of mode-locked channels having different wavelengths ([0004], [0008] and [0014]);

a multiplexer/demultiplexer (110 or 115 in Figure 1, or 610 or 618 in Figure 6) for multiplexing the plural channels into an optical signal for output.

Lee et al discloses an optical amplifier for amplifying the outputted optical signal (508 in Figure 5). But, Lee et al does not expressly disclose a semiconductor optical amplifier (SOA) for amplifying the outputted optical signal in a gain saturation state.

However, Watanabe, in the same field of endeavor, discloses a semiconductor optical amplifier (SOA) for amplifying an outputted optical signal in a gain saturation state (gain-saturated optical amplifier 6 in Figure 1, and Figure 6, column 9 line 23-30). By amplifying the optical signal in the gain-saturated region, the waveform distortion and

the amplitude fluctuations near the peak of each pulse can be suppressed, and the transmission distance can be increased (column 8, line 23-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain-saturated SOA as taught by Watanabe so that the fluctuation of the pulse intensity or the waveform can be suppressed, and transmission distance can be increased.

2). With regard to claim 2, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 1 above. And Lee et al in view of Watanabe further discloses the multi-wavelength optical transmitter, further comprising:

a broadband light source (112 or 111 broadband light sources in Figure 1, [0008]) for generating light having a wide wavelength band including a plurality of incoherent lights having different wavelengths; and

a circulator (504 in Figure 5, 613 in Figure 6) for outputting the multiplexed optical signal to the SOA, and sending light that is outputted from the broadband light source to the multiplexer/demultiplexer (B-band light is send to multiplexer/demultiplexer 110 through 504 in Figure 5),

wherein the multiplexer/demultiplexer (110 in Figure 1) demultiplexes said light that is outputted from the broadband light source into a plurality of incoherent lights having different wavelengths so as to output the demultiplexed incoherent light among the lasers ([0012]).

3). With regard to claim 4, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 1 above. And Lee et al in view of Watanabe further

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discloses wherein the multiplexer/demultiplexer includes an arrayed waveguide grating ([0061], and claim 9).

4). With regard to claim 5, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 1 above. And Lee et al in view of Watanabe further discloses wherein the lasers include a Fabry-Perot laser for generating a respective mode-locked channel by incoherent light ([0014]).

5). With regard to claim 6, Lee et al disclose a bi-directional wavelength division multiplexing system comprising a central office (Central Base Station in Figure 1) for outputting a downstream optical signal comprised of downstream channels and for receiving upstream channels, a plurality of subscriber terminals (Subscriber 1 – n, in Figure 1) for receiving said downstream channels and outputting said upstream channels, and a remote node for relaying optical communication between the central office and the subscriber terminals, wherein the central office includes:

a multiplexer/demultiplexer (110 in Figure 1) for demultiplexing an upstream optical signal into said upstream channels so as to output the demultiplexed channels, and multiplexing a plurality of downstream channels having different wavelengths into said downstream optical signal so as to output the multiplexed optical signal ([0012]);

a plurality of photodetectors (Rx 104 – 106 in Figure 1) for detecting each of said upstream channels demultiplexed by the multiplexer/demultiplexer;

a plurality of lasers (Tx{B} 101 – 103 in Figure 1) for generating mode-locked downstream channels by corresponding incoherent light received in the lasers, and

outputting the generated downstream channels to the multiplexer/demultiplexer ([0008] and [0012]-[0014]);

a plurality of wavelength selection couplers (107 – 109 in Figure 1) for outputting ones of said upstream channels, which are outputted from the multiplexer/demultiplexer, to corresponding photodetectors, outputting corresponding incoherent light to corresponding lasers, and outputting said downstream channels, which are outputted from the lasers, to the multiplexer/demultiplexer ([0011]).

Lee et al discloses optical amplifiers (507 and 508 in Figure 5) for amplifying the downstream and upstream signals. But, Lee et al does not expressly disclose a semiconductor optical amplifier for amplifying the upstream optical signal to be demultiplexed and the downstream optical signal to be outputted by the central office, which are received in the semiconductor optical amplifier in a gain saturation state, so as to output the amplified upstream optical signal to the multiplexer/demultiplexer and so as to output the amplified downstream optical signal to the remote node.

However, Watanabe, in the same field of endeavor, discloses a semiconductor optical amplifier (SOA) for amplifying an outputted optical signal in a gain saturation state (gain-saturated optical amplifier 6 in Figure 1, and Figure 6, column 9 line 23-30). By amplifying the optical signal in the gain-saturated region, the waveform distortion and the amplitude fluctuations near the peak of each pulse can be suppressed, and the transmission distance can be increased (column 8 line 23-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain-saturated SOA as taught by Watanabe so

that the upstream and downstream signals can be amplified by the SOA, and at same time, the fluctuation of the pulse intensity or the waveform can be suppressed, and transmission distance can be increased.

6). With regard to claim 10, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 6 above. And Lee et al in view of Watanabe further discloses wherein the lasers include Fabry-Perot lasers ([0014]).

7). With regard to claim 11, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 6 above. And Lee et al in view of Watanabe further discloses wherein the remote node includes a multiplexer/demultiplexer (115 in Figure 1, or 618 in Figure 6) for multiplexing said upstream channels outputted from each of the subscriber terminals into said upstream optical signal for output to the central office, demultiplexing upstream light outputted from the central office into a plurality of incoherent lights having different wavelengths so as to output the demultiplexed upstream light to a corresponding subscriber terminal (Subscriber 1- n in Figures 1 and 6), and demultiplexing said downstream optical signal into said plurality of downstream channels for output to corresponding ones of the plural subscriber terminals ([0012] and [0013]).

8). With regard to claim 12, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 6 above. And Lee et al in view of Watanabe further discloses wherein the remote node includes a multiplexer/demultiplexer (115 in Figure 1, or 618 in Figure 6) for demultiplexing upstream light and a downstream optical signal each for output to the subscriber terminals (Subscriber 1- n in Figures 1 and 6), the



multiplexer/demultiplexer of the remote node multiplexing a plurality of upstream channels having different wavelengths ([0004], [0005] and [0013], specific wavelength is allocated to each subscriber), which are outputted from the subscriber terminals, into said upstream optical signal for transmission to the central office [(0013)].

9). With regard to claim 13, Lee et al in view of Watanabe discloses all of the subject matter as applied to claims 6 and 12 above. And Lee et al in view of Watanabe further discloses wherein the multiplexer/demultiplexer of the remote node uses an arrayed waveguide grating ([0061], and claim 9) demultiplexing upstream light received in the multiplexer/demultiplexer of the remote node into a plurality of incoherent lights having different wavelengths, demultiplexing said downstream optical signal into said plurality of downstream channels, and outputting the demultiplexed downstream channels and incoherent light to the subscriber terminals.

10). With regard to claim 14, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 6 above. And Lee et al in view of Watanabe further discloses wherein each of the subscriber terminals comprises:

a laser (Tx{A} in Figures 1 and 6, [0014]) for generating a mode-locked upstream channel by corresponding incoherent light so as to output the generated mode-locked upstream channel;

a photodetector (Rx in Figures 1 and 6) for detecting a corresponding one of the downstream channels; and

a wavelength selection coupler (116 – 118 in Figure 1, or 619 – 621 in Figure 6) for outputting the mode-locked upstream channel to the remote node, outputting said

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corresponding one of the downstream channels, which is outputted from the remote node, to the photodetector, and outputting to the laser said corresponding incoherent light ([0011]).

11). With regard to claim 15, Lee et al in view of Watanabe discloses all of the subject matter as applied to claims 6 and 14 above. And Lee et al in view of Watanabe further discloses wherein the lasers include Fabry-Perot lasers ([0014]).

12). With regard to claim 16, Lee et al discloses a method for multiplexing comprising the steps of:

generating (Tx{B} and Tx{A} in Figures 1 and 6), by corresponding incoherent light received (broadband light sources 111 and 112 in Figure 1 and 611, and 612 in Figure 6), a plurality of mode-locked channels having different wavelengths ([0004], [0012]-[0015]);

multiplexing (110 and 115 in Figure 1, or 610 and 618 in Figure 6) the plural channels into an optical signal for output;

receiving the optical signal (Rx in Figure 1 and 6); and

amplifying (507 and 508 in Figure 5) the received optical signal.

But, Lee et al does not expressly disclose to amplify the optical signal in a gain saturation state.

However, Watanabe, in the same field of endeavor, discloses a semiconductor optical amplifier for amplifying an outputted optical signal in a gain saturation state (gain-saturated optical amplifier 6 in Figure 1, and Figure 6, column 9 line 23-30). By amplifying the optical signal in the gain-saturated region, the waveform distortion and

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the amplitude fluctuations near the peak of each pulse can be suppressed, and the transmission distance can be increased (column 8 line 23-67).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the gain-saturated SOA as taught by Watanabe so that the fluctuation of the pulse intensity or the waveform can be suppressed, and transmission distance can be increased.

13). With regard to claim 17, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 16 above. And Lee et al in view of Watanabe further discloses the method, further comprising the steps of:

generating light (broadband light sources 111 and 112 in Figure 1 and 611, and 612 in Figure 6) having a wide wavelength band including a plurality of incoherent lights having different wavelengths; and

outputting (4-port optical path setting 613 in Figure 6, or Figure 5) the multiplexed optical signal for said amplifying, and sending the generated light source for demultiplexing into a plurality of incoherent lights having different wavelengths so as to output the demultiplexed incoherent light among lasers ([0012]-[0014]).

14). With regard to claim 19, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 16 above. And Lee et al in view of Watanabe further discloses wherein the multiplexing is performed by a multiplexer/demultiplexer that includes an arrayed waveguide grating ([0061], and claim 9).

15). With regard to claim 20, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 16 above. And Lee et al in view of Watanabe further

discloses wherein the generating is performed by lasers that include a Fabry-Perot laser for generating a respective mode-locked channel by incoherent light ([0014]).

3. Claims 3 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 2003/0142978) and Watanabe (US 6,847,758) as applied to claim 1 above, and in further view of Kim et al (H.D. Kim: "A Low-Cost WDM Source with and ASE Injected Fabry-Perot Semiconductor Laser", IEEE Photonics Technology Letters, Vol. 12, No. 8, August 2000, page 1067-1069).

1). With regard to claim 3, Lee et al in view of Watanabe discloses all of the subject matter as applied to claims 1 and 2 above. But Lee et al does not expressly state that the broadband light source is an EDFA.

However, Kim et al, teaches that the EDFA can be used as the low-cost WDM source (page 1067, left column, I. Introduction). Kim et al provides a low cost and low loss system.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the erbium-doped fiber amplifier as the broadband light source taught by Kim et al so that a cost-effective WDM system can be obtained.

2). With regard to claim 18, Lee et al in view of Watanabe discloses all of the subject matter as applied to claims 16 and 18 above. But Lee et al does not expressly state wherein said generating light having a wide wavelength band is performed by a broadband light source that includes an Erbium-doped fiber amplifier (EDFA).

However, Kim et al, teaches that the EDFA can be used as the low-cost WDM source (page 1067, left column, I. Introduction). Kim et al provides a low cost and low loss system.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the erbium-doped fiber amplifier as the broadband light source taught by Kim et al so that a cost-effective WDM system can be obtained.

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 2003/0142978) and Watanabe (US 6,847,758) as applied to claim 6 above, and in further view of Lee et al (US 2001/0004290).

1). With regard to claim 7, Lee et al in view of Watanabe discloses all of the subject matter as applied to claim 6 above. And Lee et al in view of Watanabe further discloses wherein the central office further comprises:

a downstream broadband light source (Tx{B} 101 – 103 in Figure 1) for outputting downstream light having a wide wavelength band including a plurality of incoherent lights having different wavelengths ([0008] and [0012]-[0014]);

an upstream broadband light source (Tx{A} 119 – 121 in Figure 1) for outputting upstream light having a wide wavelength band including a plurality of incoherent lights having different wavelengths ([0008] and [0012]-[0014]);

wherein the multiplexer/demultiplexer (110 in Figure 1 or 610 in Figure 6) demultiplexes downstream light into a plurality of incoherent lights having different wavelengths so as to output demultiplexed light to each of the wavelength selection couplers (107 -109 in Figure 1, or 607 – 609 in Figure 6).

But, Lee et al (US '978) does not disclose (A) a circulator located between the multiplexer/demultiplexer and the SOA, for outputting the upstream optical signal and downstream light to the multiplexer/demultiplexer, and for outputting the downstream optical signal and upstream light to the semiconductor optical amplifier; (B) a first band pass filter (BPF) located between the downstream broadband light source and the circulator, for reflecting an upstream optical signal received in the first BPF to the circulator, and for transmitting downstream light to the circulator; and (C) a second BPF located between the upstream broadband light source and the circulator, for reflecting a downstream optical signal received in the second BPF to the circulator, and for transmitting upstream light to the circulator.

With regard to item (A), Lee et al (US '978) uses two circulators and two amplifiers to form an optical path setting device (Figure 5 and 613 in Figure 6). The 4-port optical setting device 613 performs the same function as the circulator and amplifier of applicant: output the upstream optical signal and downstream light to the multiplexer/demultiplexer and amplify the signals; that is, the teaching of the reference is functionally equivalent to the claimed limitation.

With regard to items (B) and (C), Lee et al discloses A-band light source and B-band light source, but not expressly disclose a band pass filter (BPF). However, Lee et al (US '290) teaches a BPF to limit the spectral width of the ASE (the BPF in Figure 5, [0084]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use BPF as taught by Lee et al (US '290) to the system

of Lee et al (US '978) in view of Watanabe so that the different band of wavelengths can be chosen and also can be used to reflect other wavelength bands, and a cost-effective WDM system can be obtained.

5. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al (US 2003/0142978) and Watanabe (US 6,847,758) and Lee et al (US 2001/0004290) as applied to claims 6 and 7 above, and in further view of Deng et al (US 2002/0196491).

1). With regard to claims 8 and 9, Lee et al (US '978) in view of Watanabe and Lee et al (US '290) discloses all of the subject matter as applied to claims 6 and 7 above. But Lee et al does not expressly disclose wherein the downstream broadband light source uses an Erbium doped fiber amplifier outputting spontaneous emission light in a wavelength band of 1550 nm (claim 8); and wherein the upstream broadband light source uses an Erbium doped fiber amplifier outputting spontaneous emission light in a wavelength band of 1310 nm (claim 9).

However, Deng et al, in the same field of endeavor, teaches a downstream light having a wavelength of around 1550 nm and an upstream light having a wavelength of around 1310 nm ([0033]). Deng et al uses these two bands centered far from each other to avoid transmission penalties ([0033]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use 1550 nm band as the B-band and 1310 nm band as the A-band as taught by Deng et al to the system of Lee et al so that the downstream

and upstream bands is centered far from each other and then the transmission penalties can be avoided.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Lee et al (US 2003/0163503, US 2005/0163503) discloses a method and apparatus to provide a WDM passive optical network.

Pohjola et al (US 2004/0234195) discloses an optical data transmission system comprising a passive optical fiber network.

Sugawara (US 2003/0058500) discloses a gain saturation amplifying.

Darcie et al (US 5,559,624) discloses a passive optical network system based on remote interrogation of terminal equipment.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li Liu whose telephone number is (571)270-1084. The examiner can normally be reached on Mon-Fri, 8:00 am - 5:30 pm, alternating Fri off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571)272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Li Liu  
December 5, 2006



KENNETH VANDERPUYE  
SUPERVISORY PATENT EXAMINER